Mecheleciv

VOL. 14 MAY 1955 NO. 6

SCHOOL OF ENGINEERING
THE GEORGE WASHINGTON UNIVERSITY

MAY 1955

James Chisholm, class of '41,
speaks from experience when he says,

"Men with ability and ambition really have a chance to get ahead at U.S. Steel"

● A responsible position can come quickly to those graduate engineers at U.S. Steel who show ability and ambition. Management training programs are designed to stimulate and develop these qualities as the trainee "learns by doing." His training is always a fascinating challenge and he works with the best equipment and the finest people in the business.

James Chisholm is typical of the young men who rapidly rise to an important position at U.S. Steel. Jim came to U.S. Steel as a trainee in 1941 after graduating as an M.E. Shortly thereafter he entered military service for four years. Upon his return to U.S. Steel in 1946, he advanced steadily until, in 1951, he was appointed to his present position as Assistant Superintendent of Blast Furnaces at the new Fairless Works at Morrisville, Pa.

Jim is now in charge of the unloading of all ore ships and the operation of the plant's two big blast furnaces—each with a rated output of 1500 tons per day.

Jim feels that the opportunities for graduate engineers are exceptional at U.S. Steel. He remarked that in his own department alone, six college trainees have been put into management positions within the last couple of years. He says that chances for advancement are even better now with the current expansion of facilities and the development of new products and markets.

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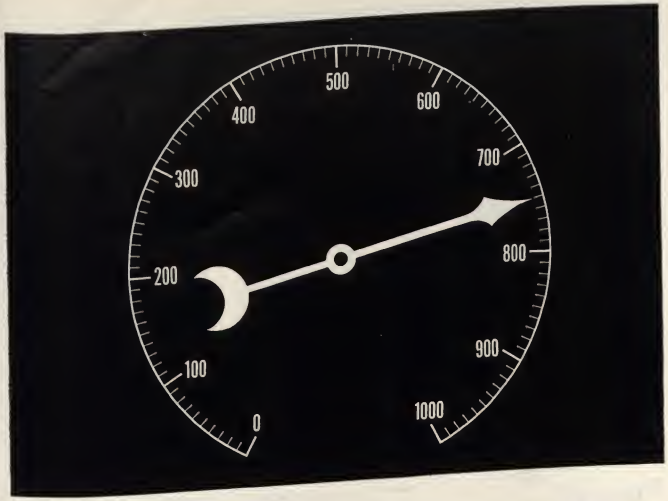

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Mechelectiv

VOL. 14 MAY 1955 NO. 6

SCHOOL OF ENGINEERING, THE GEORGE WASHINGTON UNIVERSITY

IN THIS ISSUE

ON OUR COVER

A power transformer is brought into the world's largest anechoic chamber of the General Electric Company's Pittsfield, Mass. Sound Laboratory. The Laboratory was built for study and research on the sound of power transformers

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SILICONES

By Casey Mohl

Casey Mohl hardly needs an introduction to even the most casual reader of MECHELECIV. *Besides being a frequent contributor to these pages, Casey has been an active participant in Theta Tau, Sigma Tau, The Engineers' Council and A. S. M. E. Since he is graduating this year, this will be his last contribution to* MECHELECIV, *on which he has served as Feature Editor and Associate Editor.*

INTRODUCTION

Silicones are a chemical newcomer to America's industries and homes, but since their introduction to the commercial world in 1946, they have indisputably proved their value in more than thirty major areas of commerce.

Since 1946, the silicone industry has expanded 25 times and it is forecast that the industry will treble its size in the next five years.

During World War II, military demands for smaller sized motors for warships and planes provided the incentive for the necessary research in silicones. However, it was not until after the war ended that the desired high temperature silicone insulation became a reality.

While the war proved a boon to the silicone industry, the ending of the war proved a greater boon. Publication of silicone research became permissible and the general industry was made aware of its unique properties. General Electric and Dow Corning, major producers of silicone products then and now, launched high power programs designed to find commercial usage for silicones. They found profitable initial applications in the tire industry and the die casting industry as well as in the electrical insulation field. Twenty-six other major companies were intensively studied by General Electric in an effort to find new ways to put silicones to work.

Now, even though the silicone market is greatly expanded and very diversified, some of the best men of General Electric and Dow Corning are still hard at work on the same problem, putting silicones to new work.

DESCRIPTION

Chemical

Silicones might best be described as a new class of synthetic man-made chemicals combining the best qualities of sand, coal, and oil. Although this is a combination of three abundant materials located in the earth's crust, the combination never occurs naturally. The key material is silicon, a derivative of sand, the second most abundant element on earth. The most common form of silicone is a water-white oil.

More technically, silicones are a new combination of silicon, oxygen, and one or more hydrocarbons. They represent a partnership of inorganic (silicone + oxygen) and organic (hydrocarbons) materials, blending the best features of each. The silicon and oxygen partner gives the silicones their stability, that is their ability to resist heat, cold, chemicals, and weather, while the hydrocarbon partner gives the silicones their flexibility. By varying the portions, the chemist can produce silicone products ranging from volatile liquids to stable solids.

Basic Properties

Silicones have four basic properties, none of which has yet attained maximum use.

First, silicones offer outstanding resistance to extremes of heat or cold. They remain stable up to 550° F, yet retain their properties in cold as low as minus 120° F.

This leads to many useful applications such as in silicone rubber-coated heater ducts for jet aircraft, which must remain flexible despite hot air blasting through them and freezing temperatures on the outside. The Navy has adopted a silicone rubber covered electrical communication cable. In case of fire, the insulation burns very slowly and still leaves a non-conducting residue that is capable of maintaining service. The value of this type equipment to fighting ships is apparent.

Second, silicones have amazing release characteristics. Normally, foreign objects find it extremely difficult to stick to a silicone treated surface. The quality is often referred to as silicone's "adhesive" property.

Third, silicones have very useful surface properties such as ease in spreading, water-repellancy, and durability. In addition, the low surface tension of silicones ideally equips them to be used as anti-foaming agents.

A fourth important property of silicones is inertness. Silicones refuse to act with most materials, thus enabling them to better resist decomposition and weathering, shed dirt, and resist formation of continuous films of water during rainstorms thereby decreasing the probability of shorts in electrical applications. Of even greater importance than any single property is the unique combination of properties. No other fluid has the combination of good oxidation resistance, low vapor pressure, low freezing point, good heat stability, and flat viscosity curve, that makes silicone fluids so outstanding. No other resins or rubbers have the combination of good dielectric strength, good arc resistance, good heat stability, outstanding resistance to weathering, and good low temperature properties that makes silicone resins and rubbers such excellent insulators for electrical conductors.

Physical Forms

Silicones assume five basic physical forms: fluids, compounds or greases, resins, rubbers, and one classification of silicones known as chemical intermediates or specialties.

FLUIDS

In general silicone fluids are heat-stable and resistant to oxidation, gumming, and weathering. They have excellent dielectric properties and relatively flat viscosity temperature slopes. They effect a virtually constant damping force over a very

wide range of temperatures. In addition, they are highly nonreactive and inert to metals, plastics, and most organic matter.

The trouble with most fluids, from an engineering viewpoint, is that they become thicker than molasses at zero and thin as water at 250° F. A graph of a silicone fluid (viscosity vs. temperature) shows a viscosity spread of only 200 centistokes for a 200° F. temperature change.

This excellent resistance to viscosity change along with the other properties mentioned makes practical the wide use of silicone fluids as damping and hydraulic fluids, instrument fluids, liquid dielectrics, lubricants and release agents.

Applications as a damping fluid can be found in engines, where a high viscosity silicone fluid is used to absorb torsional vibration energy of the crankshaft, and in auto and aircraft control instruments where damping fluid is used to minimize needle flutter.

Aircrafts make wide use of silicone hydraulic fluids which help minimize the effects of extreme temperatures.

An important new use for silicone fluid is transformers. The use of this relatively non-inflammable fluid with its low vapor pressure makes it possible to move the transformer indoors.

Silicone fluids are also used to form a water repellant film on a surface such as wood, rubber, textiles, etc. One familiar application of this is the impregnated paper or lens tissue for cleaning spectacles. An important point in the silicone treatment of textiles is that while the material sheds water, it can still breathe. Other waterproofing treatments exclude both air and water.

Silicone fluids are widely used as coatings for molds and dies. They provide a more efficient and clean release agent than the previous petroleum type which carbonized and smoked and didn't last very long.

A final example of silicone fluid application is as an anti-foaming agent. Silicone's low surface tension properties make it very valuable in controlling foaming in processing oils, tars, syrups, latex, etc. By keeping down the foam, expensive clean up bills are avoided and more efficient use of kettles, boilers, drums, etc., is made possible.

COMPOUNDS AND GREASES

Silicone greases are made by thickening silicone fluids by means of fillers and additives such as synthetic silica or natural silicates. Properties are similar to the corresponding fluid except that the greases can be made to resist flow at temperatures as high as 400° F.

Some typical applications of silicone grease include bearing grease for outdoor electric meters, sealed bearing grease for outdoor pumps, dual bearing grease for conveyor systems carrying products into bake ovens.

A novel use of silicone oil is in a dentist office where it is used to sterilize and lubricate hand tools. The silicone fluid, unlike its predecessors, does not break down to form a sludge or to give off foul odors even after thousands of hours at a sterilizing temperature of 300° F.

RESINS

Silicone resins offer a solution to the important problem of surface coating after prolonged exposure to elevated temperatures.

The heat-resistant silicone-oxygen molecule is modified by the addition of some organic compounds to make it soluble. The resulting protective coating is ideal for long lasting paint jobs on high temperature stacks, manifolds, heat exchangers, etc.

Silicone-base finishes possess a higher degree of heat-resistance than any other type of solvent coating. Silicone finishes have outdoor durability far surpassing other organic finishes now available. The only catch is their high cost which makes them too expensive for passenger automobiles or general purpose use. However, considering the fact that silicone finish is derived from cheap and abundant silica, it is highly possible that the price will eventually come way down.

At the present time, the big money maker in the silicone industry is its electrical insulation. Used in combination with glass cloth, mica, and asbestos, silicone resins and varnishes have made possible a new class of electrical insulation. Dow Corning refers to it as Class H insulation.

A graph of expected life in years vs temperature shows that the life expectancy of Class H insulated machines is ten times that of the next best insulating material.

This greatly reduces down time in industrial applications resulting in vast savings.

RUBBER

Silicone rubber is a synthetic, elastrometric material which retains its rubbery properties at temperatures as low as -100° F and yet renders excellent service at temperatures as high as 500° F. This relatively new semi-organic rubber is in a class by itself among rubbery materials. It contains no organic rubber, and its unique properties are obtained by proper compounding of stable silicone polymers with heat-stable fillers. Silicone rubber makes possible the design and production of equipment suitable for operation at temperatures above and below the limits set by conventional organic rubber.

Dow Corning markets a rubber with the trade name Silastic, which can be molded, extruded, laminated, or sheeted. Silastic can be dispersed in a solvent and applied as a coating by spraying or brushing.

One of the big drawbacks of silicone rubber is its high price. However, increased production is expected to lower the cost.

Typical silicone-rubber components include molded mechanical parts, gaskets, seals, O-rings, rollers, and sponge parts. In addition, it is used for rubber coating wire and cable, etc.

MISCELLANEOUS USES

At the present time, more and more applications of silicone are coming into being. For example, a suntan oil using silicone is ready for the market. The beauty of this lotion is that it will not readily wash off in water. Many types of cosmetics are planning to adapt a silicone base, especially make up cosmetics for stars of TV and movies that are subpected to extreme heat and moisture. Lotions are being made for military men in cold climes. Use of this lotion will help protect them from the extreme cold.

CONCLUSION

The silicone industry is a very healthy steadily growing industry. As better and cheaper manufacturing methods are developed and the prices of various silicone products come down, more and more commercial applications of silicone products will be made. One application with unique promise is an automobile finish that will last the life of the car and never require waxing or polishing.

The Year In Review

To say the least, the events of the past year have been many and great, the pages of MECHELECIV *have been filled with many "firsts" for the engineering school. With this in mind,* MECHELECIV *presents this resume: a synopsis of the past year dedicated to our graduating seniors.*

The '54-'55 school year was one of innovations at the George Washington University School of Engineering. Most of the major events of the year have been covered by MECHELECIV in past issues or this issue and are presented here briefly to provide an integrated picture of the year as a whole.

The Freshmen Engineers benefitted from the orientation given for the first time this year to the ME-1 Engineering Orientation classes by seniors Leon King representing the Engineers' Council and Bob van Sickler representing the MECHELECIV. Both gave interesting, well-delivered presentations filled with details of extra-curricular life at the School that heretofore have been passed largely by word of mouth with the result that most student engineers didn't become active in extracurricular activities until their junior or senior years. The number of freshmen who turned out for things such as the Career Conference and the MECHELECIV proved the value of the orientation.

The group at the other end of the student body, the graduate students, were participants in another of this year's new features; namely, the graduate student program in the field of engineering administration leading to a degree of "Master of Engineering Administration." This program is one of very few similar programs throughout the country and was designed to fill the critical need for engineers trained in the abstract problems of management. The program is about to complete a successful first year and gives every indication of playing an increasingly important part in engineering education in this country.

Revision of the Constitution of the Engineers' Council was another item on the agenda for the year which was accomplished successfully to the benefit of the School of Engineering. Although the changes may have gone unnoticed by many of the students until dramatized by the recent council elections, the changes were necessary to reflect better representation of the entire student body on the Council. Representation in the past was elected from the societies and fraternities of the School of Engineering which resulted in a Council that was composed practically entirely of juniors and seniors. The Constitution amendment provided for a reduction of the number of representatives from each society and fraternity to one, and the four classes of the School of Engineering were given the privilege of electing two representatives each. The two Freshmen representatives, Bob Shuken and Ray Sullivan, were elected from the day and evening ME-1 classes in the Fall. The remainder of the class representatives were not elected until the recent elections, the results of which are found elsewhere in this issue of MECHELECIV. The newly elected representatives will serve for the '55-'56 school year and the transition from the old to the new Constitution is complete.

About Thanksgiving time the seniors played their part in another newly introduced feature of the School, the Graduate Record Examinations. These nationally standardized tests were administered on a compulsory basis to all seniors for the first time this year. These tests provide a quantitative measure of quality of the individual student relative to a large cross-section of people who have supposedly attained the same level of academic achievement. Fairly well-substantiated statements have been known to be made which put the School of Engineering in a very favorable light as a result of the accomplishments of our seniors in this examination.

The MECHELECIV also went along with the newness trend and undertook a new approach to and, we hope, a solution of the circulation problem. In past years and for the first half of this year MECHELECIV was addressed and mailed by a private firm. After a number of subscribers had complained that they weren't receiving their copies, the MECHELECIV staff initiated a study of the situation and the findings prompted the circulation staff to take on the task of addressing and mailing the magazine themselves. The addressing is done by the Alumni Relations Department and the MECHELECIV staff. The immediate results of this change in procedure were statements by several subscribers that they had received their first MECHELECIV since October. This is gratifying justification of the extra effort put forth on the part of the circulation staff.

The Engineering Forum of the Annual Career Conference this year was probably the most successful ever held, both from the standpoint of student attendance and general excellence of the speakers. The rousing question-answer period which followed the prepared speeches was particularly stimulating and those in attendance who expect to be here next year are looking forward to next year's forum.

The Engineers' Mixer which has been an annual event had to be foregone this year. The mixer, usually held in the Fall, was postponed until the Spring semester this year because of lack of an appropriate place to hold the good-fellowship gathering. A conflict in dates forced a cancellation of the Mixer entirely but it is believed that next year will find a bigger and better mixer being held.

Undoubtedly the biggest news of the year was the long-awaited ground breaking for Tompkins Hall, the new Engineering Building. After several

(Please turn to page 14)

OUT OF THE BRIEF CASE

IN INDUSTRY

ENGINEERING AWARDS

The Washington Society of Engineers has established two annual awards, one of which is given to encourage younger members of the engineering profession to make meritorious contributions to the literature of engineering. To compete for the prize of $40 in cash and two year membership in the society, the student must be attending a university within Washington, D. C. or a twenty-five mile radius therefrom. Further details concerning the contest may be had by writing the Washington Society of Engineers, Washington, D. C.

ADVANCED DESIGN AIRCRAFT LAB.

A new laboratory dedicated to advanced design problems in pure science is soon to be built by the Martin Aircraft Company of Baltimore, Maryland. The laboratory will provide facilities to enable engineers to study the problems associated with the design and construction of a satellite vehicle. Men and programs are being selected to study such subjects as earth satellites, antigravity, nuclear physics, dissociation of gases, and photonic propulsion.

TRANSISTORIZED CAR RADIO

An experimental transistorized automobile radio that operates directly from a standard 6-volt car battery has been announced by R. C. A. The power drain of the radio is about one-tenth that of a standard set; the drain is so low that more than half of the power consumed goes to light the panel lamps. The employment of nine transistors has completely eliminated vacuum tubes, and the conventional vibrator-rectifier-transformer power supply of the standard car radio.

ICE-FREE AIRCRAFT WINDSHIELDS

Safer, ice-free windshields for aircraft are now being built as the result of a research program concluded recently at the Armour Research Foundation. The new windshield features superior glass and a mounting system that provides stress isolation for the windshield glass.

ON CAMPUS

TOMPKINS HALL—A PROGRESS REPORT

The excavation, looking south from H Street.

Ever since the groundbreaking ceremony, reported in the April MECHELECIV, the construction on Tompkins Hall has proceeded at a rapid rate. Less than half an hour after President Marvin, Dean Mason, Dr. Tompkins and Trustee Fleming turned the first shovelfulls of earth, a power shovel was noisily at work scooping earth out of the former faculty parking lot.

The progress on Tompkins resulted in a "new sound": the roar and clatter of earthmoving machinery. Despite the noises, classes continued as usual in Draper Hall only fifty feet away; students were more than happy to listen to the sounds of progress. Day by day the excavation was observed from the Davis-Hodgkins House across twenty-second street. With every passing day, the excavation grew larger as did the mounds of earth piled around it. Every evening would find neighborhood children scampering over the freshly heaped soil. Soon the main excavation was complete, and the large cranes came to dig out the footings, as shown in the accompanying photograph.

At this writing, the "new sound" of Tompkins is that of truck concrete mixers shuttling in and out of the building site. The footings are now almost complete; the displaced faculty parkers have been moved to the old gas storage tank lot: Tompkins Hall is almost a reality!

1955 ENGINEERS' BANQUET AND BALL

The engineers wound up their social season with the annual Ball and Banquet which was a smashing success. The speeches were short, the orchestra was good, and the food was superb.

One hundred and thirty engineers, faculty members, and their guests were present at the Hotel 2400 to partake in the festivities.

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ALUMVIEWS

GRADUATE LUNCHEON

On April 23, 1955, a luncheon was given at the Burlington Hotel by the George Washington University Engineering Alumni Association for this year's graduating engineers. Professor Norman B. Ames acted as Master of Ceremonies. There were interesting discussions by Dr. Cloyd H. Marvin, President of the George Washington University, Dr. Martin A. Mason, Dean of the George Washington University Engineering School, Mr. Charles B. Tompkins of the Tompkins Construction Company, and Mr. Harry C. Connor, President of the Engineering Alumni Association.

President Marvin discussed the necessary finances for the new engineering building (Tompkins Hall) and urged the support of all the alumni. Dean Mason said a few words of wisdom and discussed the future of the Engineering School. In a talk by Mr. Tompkins, donor of the new engineering building, he mentioned it was a privilege to give the building to the University. He also emphasized more English and speech training for engineers. The past accomplishments and the future work of the Engineering Alumni Association was brought out by its President, Mr. Connor.

Other distinguished persons who were introduced to the Alumni and guests were Stanley J. Tracy, President of the General Alumni Association, Mr. C. Ruefsam, the oldest living George Washington Engineering School graduate—C. E. 1892, and Miss Irene Pistorio, the first woman to graduate from the George Washington Engineering School—in 1904.

WHERE ARE YOU?

Several months ago, the staff of MECHELECIV *met with its alumni advisory board. One of the chief topics discussed was the dedication of a page or pages to the Alumni, since they as a group receive the major part of* MECHELECIV*'s circulation. It was suggested that the main feature of such a page or section be news on the Alumni, to be contributed through a coupon clipping.*

At that time, a gentleman whose wisdom is being appreciated only now spoke to the effect that you just couldn't get engineers to talk about themselves. How true this statement is is illustrated in the lack of Alumni news for this month. When consulted recently on the lack of response to our questionnaire, this same gentleman repeated his statement in stronger words; it apparently is fact.

Realizing that the engineering personality does not encompass 'self-advertisement as a trait, MECHELECIV *will retain this space in the interest of the Alumni.*

The news sources for this page are many; however, the only reliable source of news is you, the Alumni. To repeat what was said in the April issue, this is your page Mr. Alumni; about you, for you, and, we hope, by you.

Even if you just wish to let old classmates know where you are, we will print your note; just mail it to us—it's really painless, just try it!

PRESIDENT'S MESSAGE

By Harry C. Connor
President
Engineers' Alumni Association

With the close of the school year approaching, it is the time when graduating seniors in the School of Engineering will be contemplating their future with more than a little interest. On behalf of the Engineer Alumni Association, I take this opportunity to welcome the nearly fifty young men and women who will join with us as alumni of The George Washington University. In all sincerity, I can assure you that you are moving into important company—alumni of the School of Engineering are spread far and wide and are universally in responsible positions.

These seniors have already shown a definite interest in their Alumni Association by their fine attendance at the Annual Luncheon held on April 23rd. The enthusiasm evidenced at that time will be a valuable contribution to the future plans of the Engineer Alumni Association.

There is much to be done to continue the growth of the Association for the benefit of our Alma Mater. The highlights of this year's activities, I think, the increased response to our membership drive and the considerable support lent to the MECHELECIV magazine through subscriptions. Many alumni attended the groundbreaking ceremonies for the Tompkins Hall of Engineering and the support of the annual luncheon was encouraging.

In the near future, paid members of the Association will receive their ballots for 1955-56 officers in the organization. These new officers will have several recommended activities that could make the coming year the most active in the history of the Association.

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EYE-EXAM for a BATTLESHIP

Western Electric field engineers supervise installation of complex electronic equipment made for Armed Forces

Marco Polo had nothing on Western Electric's field engineers. They travel the world to advise on use, installation and maintenance of the electronic equipment we produce for the Armed Forces . . . like radar bombing systems, anti-aircraft fire control systems, and the Nike guided missile control system.

Western Electric is called upon to make these things because of its vast experience with highly complex electronic equipment as the manufacturing unit of the Bell System. It's a job that presents an unending challenge to our engineering staff.

Western Electric

MANUFACTURING AND SUPPLY UNIT OF THE BELL SYSTEM

Western product and development engineers are responsible for turning out some 50,000 different items annually for the Bell System – everything from tiny transistors to giant bays of electronic switching equipment. Shown is one stage of transistor manufacture.

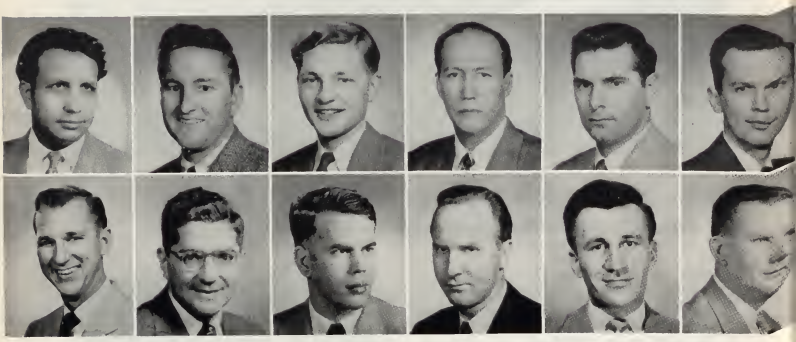
Our 1955 Graduates

THE MECHELECIV TAKES PLEASURE IN PRESENTING SCHOOL OF ENGINEERING GRADUATES

For The 1954-55 School Year

Presented Through The Courtesy Of

THE ENGINEERING SOCIETIES AND FRATERNITIES



FIRST ROW:

Abdul K. Azad	B.M.E.
George R. Bierman	B.M.E.
C. Kingsley Brown	B.M.E.
Edward Joseph Chesley	B.S.M.E.
James John Crenca	B.E.E.
Hasell W. Crouch	B.M.E.

SECOND ROW:

Thomas G. Flanagan, Jr.	B.C.E.
Almerigo Giraldi	B.C.E.
Clare A. Kennedy, Jr.	B.E.E.
Leon H. King	B.E.E.
Paul Kuzio	B.C.E.
Robert P. Little	B.E.E.

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STANLEY J. VEST ---------- B.E.E.

WILLIAM A. WEIDEMEYER ---------- B.C.E.

STRATY ZERVAKOS ---------- B.C.E.

GRADUATES NOT PICTURED

HOLLIS KENT KUSHMAN ---------- B.E.E.

MARIFRANCES O'KEEFE ---------- B.E.E.

ANDREW CALVIN MADSEN ---------- B.S.E.

EDWARD LEE MALEC ---------- B.S.E. Bus. Admin.

WILLIAM EDWARD MILTE ---------- B.E.E.

RUDOLPH WALTER NESS ---------- B.E.E.

FRANK S. ROBINSON ---------- B.M.E.

JOHN WILLIAM SAVAGE ---------- B.E.E. Comm.

JACK POWELL STELL ---------- B.E.E.

RALPH FRANKLIN THOMPSON ---------- B.S. Eng.

WALTER HENDERSON WOOD ---------- B.E.E. Comm.

BASIL BOTELER ---------- B.C.E.

HARRY M. BRANDLER ---------- B.E.E.

HOWARD L. CRUMLEY ---------- B.E.E.

PAUL OLIVER DRURY, JR. ---------- B.E.E.

WILLIAM F. DUNN ---------- B.E.E.

KEITH HARRISON FELLOWS ---------- B.C.E.

HOWARD W. FLIEGER, JR. ---------- B.S.E.

ROBERT M. GAERTNER ---------- B.C.E.

LYMAN EVANS GOODNIGHT, JR. ---------- B.M.E.

PRAVEEN KANTILAL JARIWALA ---------- B.E.E.

Societies and Fraternities

CONTRIBUTING THESE PAGES FOR OUR 1955 GRADUATES

THETA TAU

Gamma Beta Chapter

SIGMA TAU

Xi Chapter

AMERICAN SOCIETY OF MECHANICAL ENGINEERS

Student Branch

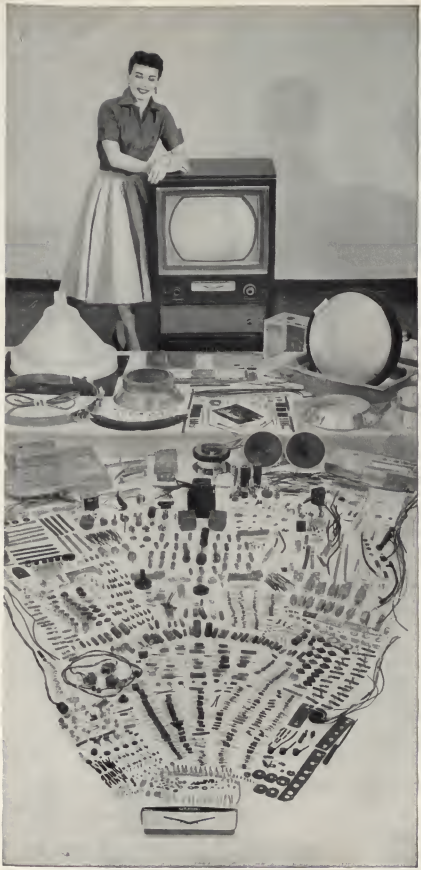
AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS

INSTITUTE OF RADIO ENGINEERS

Joint Student Branch

AMERICAN SOCIETY OF CIVIL ENGINEERS

Student Branch



This picture shows how RCA helps small manufacturers grow

Today the inter-dependence between manufacturer and supplier is stronger than ever in the history of American business. For in the challenging new age of electronics, hundreds upon hundreds of component parts are needed in the manufacture of new products.

For example, the superb new RCA Victor 21-inch color TV set shown here contains 2,070 parts. These are made by 600 different suppliers, most of whom are small businesses.

Indeed, more than three-quarters of all RCA suppliers are small business firms that receive nearly one-half of RCA's purchasing dollars. They, in turn, have their suppliers of raw materials. Thus through a long line of cooperative effort, employment is provided for countless people in many fields—and an entire economy benefits.

RCA salutes its full roster of 7,500 suppliers, located in 43 states, for their inventiveness and resourcefulness that contribute so much to the quality and performance of its products. With these firms at our side, RCA continues to march forward, creating new and better "Electronics for Living"—electronics that make life easier, safer, happier.

WHERE TO, MR. ENGINEER?

RCA offers careers in research, development, design, and manufacturing for engineers with Bachelor or advanced degrees in E.E., M.E. or Physics. For full information, write to: Mr. Robert Haklisch, Manager, College Relations, Radio Corporation of America, Camden 2, N. J.

RADIO CORPORATION OF AMERICA
ELECTRONICS FOR LIVING

(Continued from page 6)

years of disappointing delays, the formal ground breaking ceremony was held on April 7, 1955 at 9:30 a.m. After the first shovelfulls of earth had been turned by President Marvin, Dean Mason, Trustee and Donor Charles H. Tompkins, and Trustee Chairman Robert Fleming, the work proceeded at a rapid rate and a yawning excavation now greets visitors to the building site. There is well-founded hope that the Engineering classes for the '56 Spring semester will be held in Tompkins Hall.

Many of the students who responded so well to the questionnaire which was circulated to all undergraduate students last December by the Faculty Committee on Evaluation, of the School of Engineering, are undoubtedly interested in its outcome. The findings are summarized in another article in this issue of MECHELECIV but a word or two here on the subject would not be out of order. The Faculty Committee on Evaluation, has been steadily at work for several years on the formulation of educational objectives for the School, evaluation of how well they are being realized, and more recently on curriculum design. As a part of this program it was found desirable to obtain information concerning the educational aims of the students and their preferences and opinions on matters of mutual concern. The questionnaire was the answer to the problem. The high-percentage return was gratifying to the Committee and the students can rest assured that, where deemed desirable for the School as a whole, their suggestions and criticisms are being acted on.

The social activities of the School of Engineering were brought to a climax at the Engineers' Banquet and Ball which was held on May 7 at Hotel 2400 and which is covered elsewhere in this issue.

All that remains now is the final hurdle of examinations and, for the seniors, the activities associated with graduation. The staff of MECHELECIV wishes success in the examinations to all students and the best that life has to offer to our graduating seniors.

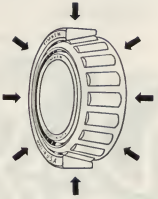
Another page for **YOUR BEARING NOTEBOOK**

How to increase gear life in a scraper

When this 13 cubic yard scraper, fully loaded, travels at 25 MPH over rough terrain, the gears in the differential, engine shaft and pinion get a workout. Realizing this, the engineers specified Timken® bearings for these vital applications. The tapered construction of Timken bearings lets them take radial and thrust loads in any combination. Gears are held rigidly in place. Perfect tooth-mesh is maintained. Gears last longer.

How TIMKEN® bearings hold gear shafts rigid

The line contact between rollers and races of Timken bearings gives shafts rigid support over a wide area. Shaft deflection is minimized. And the tapered design of Timken bearings permits them to be set up with the most desirable amount of end play or preload that gives the best performance.



Want to learn more about bearings or job opportunities?

Some of the engineering problems you'll face after graduation will involve bearing applications. For help in learning more about bearings, write for the 270-page General Information Manual on Timken bearings. And for information about the excellent job opportunities at the Timken Company, write for a copy of "This Is Timken". The Timken Roller Bearing Company, Canton 6, O.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃
BEARING TAKES RADIAL ◊ AND THRUST -0- LOADS OR ANY COMBINATION ✳

OUT OF THE BRIEFCASE

(Continued from page 7)

The chief feature of the banquet, the awarding of keys and medals, began with the presentation of Engineers Council Keys by Professor Cruickshanks to Sam Mawhood, Derrill Rohlfs, Stanley Vest, Paul Kuzio, Casper Mohl, Carl McCall, Harry Brandler, Henry Paris, Michael Brady, Bob van Sickler, Ray Sullivan, Bob Shuken and Clare Kennedy. The keys are presented for the promotion of engineering school functions. Keys were presented last year to Leon King and Tom Flanagan.

The ASCE represented by Professor Walther presented the chapter achievement award to Al Giraldi and the ASCE Student Paper award to Tom Birmingham. Next in line the ASME award was presented by president John Cannon to George Bierman who then returned to the stage to present the ASME 75th anniversary award to Clare Kennedy.

The annual Sigma Tau award to the sophomore with the highest scholastic average in his freshman year was presented to Orrin Kee by the president Tom Cresswell. A special plaque in recognition of outstanding service to Sigma Tau was awarded Professor Cruickshanks.

MECHELECIV keys were presented to Kingsley Brown and Stanley Vest by Professor Ames.

The Theta Tau activities plaque, awarded annually to the member of the senior class who has the most outstanding record of activities went to Bob van Sickler. Although the award is sponsored by Theta Tau, the selection is made by the Dean's Council.

This year's Ball and Banquet marked two firsts; the school calendar carried a listing of the event, and regular programs for the evening were printed. Thanks for these two innovations and for the whole enjoyable evening go to Tom Flanagan, chairman of the Ball and Banquet committee of the engineers' council.

O.D.K. TAPS

At the May day ceremonies on May 6 in Lisner Auditorium Omicron Delta Kappa tapped Sam Mawhood, Business Manager of MECHELECIV. ODK is an honor society recoguizing outstanding leadership on the University campus, and claims many faculty members in its roster.

Sam is a senior (class of '56) with a major of communications in Electrical Engineering. Besides being business manager of MECHELECIV, his many contributions to engineering life at GW include membership in Theta Tau, Sigma Tau and Pi Delta Epsilon, Circulation Manager for MECHELECIV, counciling committee chairman for Sigma Tau and active membership in IRE.

(Please turn to page 24)

ALUMVIEWS

(Continued from page 8)

On the list of possible events is an Engineer Mixer, sponsored by the Association, at the beginning of the Fall term. An Engineers' Day featuring on campus forums and seminars with outstanding engineers present, is another program under discussion. Of course, the Association will want to play a major role in the furnishing of the new School of Engineering Building.

To make all of these plans a reality, your support as interested and working alumni is needed. I know we can count on your continued devotion to your University.

CORRESPONDENT WANTED

Lo Tzu-Kun of the Ordnance Engineering College, Formosa is seeking a correspondent with like interests. Lo is 23 and is a Junior in Mechanical Engineering; besides his chosen vocation, he enjoys outdoor sports and classical music. His complete address is: Lo Tzu-Kun, P.O. Box Tai-0267 Taipei, Taiwan (Formosa), Free China.

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Two years ago we announced the world's most powerful production aircraft engine.

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Division of United Aircraft Corporation

East Hartford 8, Connecticut

"The Questionaire": An Interpretation

Virtually all members of the School of Engineering are familiar with the questionnaire which was sent to all of the 550 undergraduate students in the School in December, 1954. Sixty-two percent of the student body answered and returned this questionnaire, indicating a high level of interest on the part of GWU engineering students in their school: naturally these students and others are interested in the questionnaire's purpose and its outcome. Some brief comments on purpose and results are therefore in order so that those who cooperated in this study may share in the increased understanding that it promotes.

The interpretations given here are those of the Faculty Committee on Evaluation, summarized of necessity due to critical space shortage.

The questionnaire dealt with five major topics which might be paraphrased roughly as follows:

1. Where are you from, and what is your background of preparation?

2. Why do you want to be an engineer, and why did you decide to come to GWU?

3. What kind of engineering work do you want to do as a career?

4. What kind of education do you think you need, in preparation for that career?

5. What is your opinion of the adequacy of the education you are getting?

The answers show that 61 percent of GWU engineering students enter from high school. Eighty-three percent of the total did not apply for admission to another engineering school at the time they entered GWU. The overwhelming majority of GWU engineering students were most interested in mathematics or science in high school, and a similar large majority made their best high-school grades in these subjects.

The preponderance of the reasons for wanting to become an engineer had to do with a combination of natural interest, the prospect of reasonable economic security, and consciousness of the social need for engineers. Availability of evening courses was apparently the major factor in the choice of GWU since almost two-thirds gave that as a reason; proximity of school to home seemed to be a similarly important factor. The academic and professional standing of the school was also given as a reason in a large number of replies. About 90 percent expect to complete their studies at GWU.

Ninety-two percent expect to make engineering their career, with design, research, management, and administration being the most favored types of work.

It is encouraging to see that 73 percent of engineering students want theoretical or "why" courses, and 78 percent want to develop the ability to analyze and create. These are courses and developed abilities which distinguish engineering education from technician training.

In any large group of people, *some* are bound to feel some dissatisfaction at a particular time. For this reason it is difficult to interpret correctly the fact that an average of 70 percent of our students are satisfied with instruction, courses, facilities, and attention to student needs. Still, the answers are helpful and we also know of some problems where we are not doing as well as we should like to; so no one in the School intends to be complacent about these matters. The students' opinions, criticisms, and suggestions are not being ignored just because they aren't summarized. They will be (and indeed are now being) used in forming policy within the faculty.

In closing, the Committee, on behalf of the Faculty of the School of Engineering, wishes to express its thanks to the large number of students who cooperated in the study. The information obtained may be expected to be of considerable help in future planning, organization, and curriculum design; students will probably derive many future benefits from the results of this questionnaire.

brand new world

As a major step in its pace-setting program of advance planning, The Glenn L. Martin Company has expanded its operations into the field of nuclear power.

This means that a top team of scientists, physicists and engineers is being integrated under the Martin method to carry on a planned, long-range program in this tremendous new science.

There are exceptional opportunities for creative engineers.

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Mecheleciv Annual Financial Report

For the year ending May 30, 1955

Published for the information of the students and faculty who have unfounded reasons for doubting the integrity of the MECHELECIV staff.

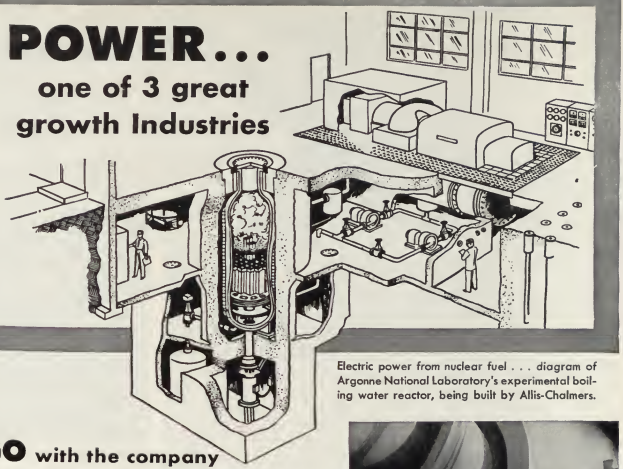
INCOME

Subscription (to editor's father)	$ 2.00
Advertising	20.15
Sales	2.61
Offerings collected by business manager posing as deacon at church	640.01
Editor's hobby (printing $5 bills)	8,765.00
Sale of filing cabinets	66.20
Sale of typewriter to exponent	200.00
Sale of old lab reports	4,214.63
Sale of completed Chem 11 &12 experiments	225.33
Commission on engraving	250.00
Deposit refund on feature editor's empty beer bottles	12,695.26
Paid on blackmailing operations	
From Students	1,433.70
From Faculty	27,217.25
Commission on Brownley's option	200.00
TOTAL	$ 55,932.14

EXPENDITURES

Printing costs	$ 6,250.80
Bribes for articles	11,987.63
Bribe to stay in good graces of FOGGY BOTTOM	4,500.00
Salaries	27,272.21
Key chain for editor	15.03
Engraving	812.64
Bad debts	1,200.72
Telephone	
Business	.50
Social	814.23
Strait jacket for business manager (white, with pleats)	39.50
25 two-way wrist radios for final exams	1,653.23
Cadillac for business manager	7,500.28
Cadillac upkeep and operation	19,793.93
Lawsuit by NEBRASKA BLUEPRINT for borrowing this financial statement	5,000.00
Tickets for Engineer's Ball & Banquet (for Staff)	80.00
Circulation to friends and relatives	23,001.75
G. W. to lose (football)	8,862.03
Commissions on advertising and sales	7,666.66
Discount on same	.05
Christmas present for staff	175.42
Donation for Truman's portrait	.25
Liquor	16,885.55
Chaser	.60
Cigarettes	2,651.20
Slide rule for art editor	24.50
Tips to janitor	400.00
Option on Brownley's	3,200.00
Haircuts for the editor	10.00
Unaccounted for and miscellaneous	20,000.00
Miscellaneous and unaccounted for	5,000.00
TOTAL EXPENDITURES	$174,798.71
Deficit	$118,866.57

POWER...
one of 3 great growth Industries



Electric power from nuclear fuel . . . diagram of Argonne National Laboratory's experimental boiling water reactor, being built by Allis-Chalmers.

GO with the company that's strong in all three!

Hitch your future in engineering to the growth of the U. S. A.—and to a company that supplies the basic needs of growth!

This nation is growing at the rate of 50,000 people every *week!* To supply the needs of these people:

Electric power generation will double by 1965.

A multi-billion dollar program of new highway construction is planned within the next ten years.

Manufacturing output will have to increase by $3.5 billion by this time next year.

And Allis-Chalmers builds major equipment for all of these growth industries! Some examples are pictured here.

Here's what Allis-Chalmers offers to Young Engineers:

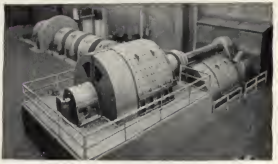
A graduate training course that has been a model for industry since 1[illegible]. You have access to many fields of engineering: electric power, hydraulics, atomic energy, ore processing.

There are many *kinds* of work to try: design engineering, application, research, manufacturing, sales. Over 90 training stations are available, with expert guidance when you want it. Your future is as big as your ability can make it.

Or, if you have decided your field of interest and are well qualified, opportunities exist for direct assignments on our engineering staff.

In any case—learn more about Allis-Chalmers. Ask the A-C manager in your territory, or write direct to Allis-Chalmers, Graduate Training Section, Milwaukee 1, Wisconsin.

CONSTRUCTION demands the vast tonnages of cement produced with Allis-Chalmers rotary kilns and other processing machinery.



MANUFACTURING depends upon the reliable power of electric motors—like these 5000 hp Allis-Chalmers giants powering a rolling mill.

ALLIS-CHALMERS

A-4693

ELECTION RESULTS

ENGINEERS' COUNCIL MEMBERS

OPEN ELECTION

Senior	Sam Mawhood
Senior	Tom Creswell
Junior	Joe Greblunas
Junior	Anthony T. Lane
Sophomore	Howard R. Davis
Sophomore	Fred Shelton
Freshmen	2 from ME-1 next year

ORGANIZATION REPRESENTATIVES

IRE	Earl Reber
AIEE	Michael Brady
ASME	Orrin E. Kee
ASCE	Joseph Bell
Theta Tau	Harlan Oelke
Sigma Tau	John Madaris
House Manager	not appointed yet
Mecheleciv	not appointed yet

THETA TAU

Regent	Matthew Foster
Vice Regent	Sam Mawhood
Scribe	Vic Yurrow
Assist. Scribe	Francis Mikalauskas
Treasurer	Don Keever
Assist. Treasurer	Dick Pronk
Corresp. Secretary	Harlan Oelke
Marshall	James Cauffman
Inner Guard	Earl Reber
Outer Guard	Robert Witham
Faculty Advisor	Prof. Miklofsky

SIGMA TAU

President	Thomas J. Creswell
Vice President	Sam Mawhood
Treasurer	Irvin Schick
Recording Secretary	George Rodgers
Corresponding Secretary	Arthur Wedler
Historian	Harlan Oelke
Eng. Council Rep.	John Madaris
Faculty Advisor	Prof. Cruickshanks

AIEE-IRE

Chairman	Harlan Oelke
Vice Chairman	Earl Reber
Local Secretary	John Madaris
Treasurer	Charles N. Smith
AIEE Corresp. Secretary	Joe Greblunas
IRE Corresp. Secretary	James Cauffman
IRE Eng. Council Rep.	Earl Reber
AIEE Eng. Council Rep.	Michael Brady
Faculty Advisor	Prof. Donald Hanrahan

ASME

Chairman	John A. Cannon
Vice Chairman	James Moy
Secretary	Victor Yurrow
Treasurer	Subbiah Sankaran
Engineers' Council Rep.	Orrin E. Kee
Faculty Advisor	Prof. Greely

ASCE

President	Tom Birmingham
Vice President	Bill Stamper
Treasurer	Dick Rumke
Secretary	Joe Scott
Eng. Council Rep.	Joe Bell
Faculty Advisor	Prof. Walther

1927—Unloading cargo from Boeing mail plane

1955—Loading Boeing C-97 Stratofreighter

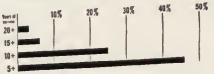
There's plenty of variety in Boeing engineering careers

America's pioneer passenger-cargo aircraft, the 40A, was a Boeing. So is the Air Force's versatile tanker-transport, the C-97 Stratofreighter shown above.

During the company's 38-year history, Boeing engineers have blazed new trails in the design of aerial freighters and tankers, commercial airliners, flying boats, fighters, trainers and bombers. Today Boeing continues to offer engineers a wide variety of opportunities in Research, Design and Production.

Students sometimes are surprised that Boeing's engineering staff includes those with civil, electrical, mechanical, aeronautical and other engineering degrees. Yet all find application in aviation. For example, the civil engineer may work on airframe structure or stress. Electrical engineers find challenge in the complicated electrical and electronic systems of modern jet bombers and guided missiles. Other engineers will find similar application for their talents.

The high degree of stability in careers at Boeing is reflected in this chart.



It shows that 46% of Boeing engineers have been with the company five or more years; 25% for 10 or more years, and 6% for 15 years.

Boeing promotes from within, holds regular merit reviews to assure individual recognition. Engineers are encouraged to take graduate studies while working and are reimbursed for all tuition expense.

Current Boeing programs include: six and eight jet bombers; America's first jet transport—the 707; F-99 Bomarc pilotless interceptor (guided missile)—and advanced projects such as the application of nuclear power to aircraft.

For further Boeing career information consult your Placement Office, or write:

JOHN C. SANDERS, Staff Engineer—Personnel
Boeing Airplane Company, Seattle 14, Wash.

BOEING

SEATTLE, WASHINGTON WICHITA, KANSAS

OUT OF THE BRIEFCASE

(Continued from page 16)

BRIGHT OUTLOOK FOR GW ENGINEERS

Every May the speculation on senior starting salaries reaches its peak. What are graduates in other colleges getting? What are other majors getting upon graduation? The United Press recently released a bulletin, réprinted below by permission of Mr. Julius Frandsen of U. P.'s Washington bureau.

CHICAGO, April 30 (UP). Job opportunities and starting salaries for the June college graduate are hitting an all-time record high, a Nation-wide survey showed today.

This year starting salary offers are up about five to seven percent over last year, and job opportunities were described as the best ever.

Engineering graduates were the choicest plums, with industry offering them $350 to $500 a month to start. The general average was about $400, a new record. A peak of $500 a month was reported at George Washington University in Washington, D. C.

Yale said some engineering firms are offering houses, automobiles and country club membership to students.

MECHELECIV extends its heartiest congratulations to our successful seniors!

— THANKS —

MECHELECIV would like to thank the following alumni who have subscribed since the March issue:

Anthony R. Barbuto	'43	Washington, D. C.
Roger T. Boyden	'21	Washington, D. C.
Gilbert Brooks	'33	Arlington, Va.
Bernard B. Chew	'40	Inglewood, Calif.
Howard S. Cole	'32	Washington, D. C.
Alvis M. Craft	'50	Alexandria, Va.
Warren C. Crump	'40	Washington, D. C.
John T. Fearnow Jr.	'51	Winchester, Va.
Matthew Flato	'49	Silver Spring, Md.
Thomas G. Haggenmakee Jr.	'54	Silver Spring, Md.
Dwight F. Hastings	'48	Wellesley, Mass.
Raymond F. Muth	'38	Wolf, Pa.
Andrew E. Orebaugh	'49	Berkeley Springs, W. Va.
George W. Plondke	'48	Columbus, Ind.
Irving R. Saum	'11	Bethesda, Md.
R. H. Spitzer	'51	LaMesa, Calif.
Claude C. Dimmette Jr.	'50	Washington, D. C.
Frederick M. Holcomb Jr.	'52	Washington, D. C.
Ray A. Pteritas		Washington, D. C.
William L. Reed Jr.	'51	Washington, D. C.
Hsin Ping Wong	'51	Washington, D. C.

PHOTOGRAPHY AT WORK—No. 15 in a Kodak series

How good is this spot for a poster?

—photography was put on watch to find out

Photography adds striking realism to highway poster.

In the hands of Alfred Politz Research, Inc., camera and film sampled the traffic, spaced test periods, stayed on the job, never got tired and reported with complete accuracy.

You can gauge a magazine's readers by its circulation—or a newspaper's by its daily sales. But how can you measure the potential audience of an outdoor poster?

Alfred Politz Research, Inc. worked out an answer. Figuring that anyone the poster can "see" can see the poster, they set up an automatic camera which recorded periods of passing traffic at regular intervals. Counting the people and cars on the film records gave accurate figures on the viewers of the poster and made it possible to compute its gross man-hours of exposure.

Counting people comes as easily for photography as counting phone calls, metal rods or tons of coal. It is one of the many ways it is serving all kinds of business and industry. In small businesses and large it is helping to save time, cut costs, reduce error, design new products and improve production.

Graduates in the physical sciences and in engineering find photography an increasingly valuable tool in their new occupations. Its expanding use has also created many challenging opportunities at Kodak, especially in the development of large-scale chemical processes and the design of complex precision mechanical-electronic equipment. Whether you are a recent graduate or a qualified returning serviceman, if you are interested in these opportunities, write to Business & Technical Personnel Dept., Eastman Kodak Company, Rochester 4, N. Y.

Kodak
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As a G-E representative in one of the Company's 152 Apparatus Sales Offices in key cities, you work with customers to determine what design, new development or system will best serve their needs. The program offers—in addition to exciting district work—career opportunities in the Company's headquarters marketing and sales operations. SJ-526

*ILLUSTRATION: *Sales Engineer and customers discuss turbine rotor construction. Glasses are factory safety measure.*

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GENERAL ELECTRIC COMPANY
SCHENECTADY 5, N. Y.

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COLLEGE ..... DEGREE & YEAR .....

ADDRESS .....

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